

BULLETIN

OF THE INSTITUTE OF METALS

VOLUME 3

OCTOBER 1955

PART 2

INSTITUTE NEWS

1956 Spring Meeting

The 1956 Spring Meeting will be held in London from Tuesday to Friday, 10-13 April.

The meeting will begin on the evening of Tuesday, 10 April, when Dr. WILLIS JACKSON, F.R.S., M.I.E.E., F.Inst.P., Director of Research and Education, Metropolitan-Vickers Electrical Co., Ltd., will deliver the 46th May Lecture.

The Annual Dinner and Dance will be held at Grosvenor House on the evening of Wednesday, 11 April, and on the Thursday evening (12 April) there will be an informal conversazione at 4 Grosvenor Gardens.

The new President, Major C. J. P. BALL, D.S.O., M.C., F.R.Ae.S., will deliver his Presidential Address at Church House, Westminster, on the morning of Wednesday, 11 April, and on the afternoon of that day and the morning and afternoon of the Thursday there will be scientific sessions in the same building.

The annual Symposium arranged by the Metallurgical Engineering Committee will take place on Thursday, 12 April. The subject will be "The Final Forming and Shaping of Wrought Non-Ferrous Metals and Alloys".

It is hoped to be able to arrange visits to works and laboratories in the London area on Friday, 13 April.

Second World Metallurgical Congress

At the recent Joint Metallurgical Societies' Meeting in Europe, a cordial invitation was issued to members of the Institute of Metals to attend the Second World Metallurgical Congress, organized by the American Society for Metals, which will be held in Chicago on 2-8 November 1957.

Election of Members

The following 16 Ordinary Members, 1 Junior Member, and 2 Student Members were elected on 17 August 1955:

As Ordinary Members

BILONI, Heraldo, Ingeniero Aeronautico, Laboratorio de Metalurgia, Comision Nacional de Energia Atomica, Av. Lib. Gral. San Martin 8250, Buenos Aires, Argentina.

BROSCH, John Reardon, Joint Managing Director, John E. Mapplebeck, Ltd., Frankfort Street, Birmingham 19.

CARREA, Antonio Jose, Lic. Quim., Laboratorio de Metalurgia, Comision Nacional de Energia Atomica, Av. Lib. Gral. San Martin 8250, Buenos Aires, Argentina.

COLLINS, James A., M.S., Ph.D., Supervisor, Engineering Materials Group, Engineering Service Division, E. I. du Pont de Nemours and Co., Inc., Wilmington 98, Del., U.S.A.

GRAHAM, John Alexander, Works Manager, Low Moor Fine Steels, Ltd., Low Moor, Bradford.

KRANTZ, Boudewijn Franciscus, General Director, N. V. Nederlandse Koperenbuizenfabriek (Dutch Copper Tube Works), Zijldijk 19, Leiderdorp, Netherlands.

LINDQUIST, Raymond Charles, A.B., LL.B., M.S., Director, Cleveland Public Library, 325 Superior Avenue, Cleveland 14, Ohio, U.S.A.

NICHOLLS, Arthur Stanley Lowe, Metallurgist, W. Brown and Sons Pty., Ltd., 66 Port Road, Hindmarsh, South Australia.

NIJHAWAN, Bal Raj, B.Sc., Ph.D., F.I.M., Deputy Director, National Metallurgical Laboratory, Council of Scientific and Industrial Research, Jamshedpur, India.

PARR, Gordon Haig, Divisional Sales Manager, Wire Mills, British Insulated Callender's Cables, Ltd., Prescott, Lancs.

REDER, Frederick H., Manager and Director, London Zinc Mills, Ltd., Brimsdown, Middx.

SAXON, Rodney Thomas, A.I.M., Metallurgist, Rotol, Ltd., Cheltenham Road, Gloucester.

SCOTT, Bernard Walter, B.Sc., Metallurgist, Sparklets, Ltd., Queen Street, Tottenham, London, N.13.

STONEBURNER, Donald Forrest, Met. Eng., Junior Metallurgist, Oak Ridge National Laboratory, P.O. Box P., Oak Ridge, Tenn., U.S.A.

TENDOLKAR, Gangadhar Sadashiv, B.Sc., Ph.D., Metallurgist, Department of Atomic Energy, Government of India, Old Yacht Club, Apollo Pier Road, Bombay 1, India.

TITLOW, Robert A., A.B., Chief Process Engineer, Fabricast Division, General Motors Corp., P.O. Box 271, Bedford, Ind., U.S.A.

As Junior Member

MCALLISTER, David, Metallurgical Assistant, The Mint, Birmingham, Ltd., Icknield Street, Hockley, Birmingham 18.

As Student Members

BOETTNER, Raymond C., B.Chem.Eng., M.Eng., Research Assistant, Hammond Metallurgical Laboratory, Yale University, New Haven, Conn., U.S.A.

GAUNT, Paul, B.Sc., Inorganic Chemistry Laboratory, University of Oxford.

CORRESPONDING MEMBERS TO THE COUNCIL

Argentina**Señor J. A. Sabato**

Jorge Alberto Sabato was born at Rojas, in the Argentine Republic, in 1924 and studied physics at the Instituto del Profesorado de Buenos Aires. He subsequently taught



physics for three years in a secondary school and published a textbook "Introducción a la Física". Entering the metallurgical field in 1951, Señor Sabato was responsible for organizing the Research Department of Guillermo Decker S.A., Buenos Aires, which was the first non-ferrous research laboratory to be set up in Argentina. He remained as Director of the Department for three and a half years, during which time he twice visited Europe to inspect laboratories, &c. In November 1954, Señor Sabato resigned in order to become Director of a new metallurgical research organization IMET (Investigaciones Metalúrgicas). He is also consulting metallurgist to the Argentine Atomic Energy Commission.

Australia**Mr. Clement Blazey**

Clement Blazey was educated at Melbourne University, where he graduated M.Sc. in geology, petrology, and mineralogy, and B.Agr.Sc. in agricultural science. Later he studied metallurgy at the Royal School of Mines, London, under the late Professor Sir Harold Carpenter. As metallurgist, first to



the Munitions Supply Department of the Commonwealth Government, and, since 1922, as metallurgist and, later, chief metallurgist to Metal Manufactures, Ltd., Port Kembla,

N.S.W., he has been associated for many years with the non-ferrous metal manufacturing industry, principally in the fields of small-arms ammunition; copper and copper alloy wire, strand, and tubes; aluminium wire, strand, and tubes; and lead-covered telephone cables. He was one of the founders of the Port Kembla Branch of the Australian Institute of Metals and the Illawarra Branch of the Australasian Institute of Mining and Metallurgy, and at various times has served as President of each Branch. He was a Councillor of the Australasian Institute of Mining and Metallurgy from 1943 to 1947 and Federal President of the Australian Institute of Metals in 1953 and again in 1954. At the present time he is immediate Past-President and an Honorary Member of the Australian Institute of Metals. Over the years he has contributed widely to metallurgical journals, including the *Journal* of the Institute of Metals. In 1949, in conjunction with his colleagues, he received a Capper Pass Award of the Institute and in 1952 he was awarded the Florence Taylor Medal of the Sydney Branch of the Australian Institute of Metals.

Professor H. K. Worner

Howard Knox Worner was born in 1913 at Swan Hill, Vic., Australia. He was educated at Bendigo Technical



School (1929-30) and Bendigo School of Mines (1930-32), where he was a Gold Medallist. He then entered Melbourne University to study chemistry and metallurgy. He obtained the B.Sc. degree with First-Class Honours in 1934 and the M.Sc. degree in 1936. From 1935 to 1936 he was Demonstrator in Physical Metallurgy at Melbourne University and Evening Lecturer in Heat-Treatment at the Melbourne Technical College; then he was appointed Lecturer in Metallurgy at the University. From 1935 to 1938 he carried out research under Professor Greenwood into the properties—particularly the creep properties—of lead and lead-rich alloys. For this work and other work on dental alloys and related materials, he was awarded the D.Sc. degree in 1942.

Between 1939 and 1946 Dr. Worner was Research Fellow of the National Health and Medical Research Council and Officer-in-Charge of the Dental Materials Laboratory in the Australian College of Dentistry. Early in the war, he was appointed Honorary Scientific Consultant to the Medical Equipment Control Committee and the Defence Services. He spent three months in New Guinea and Bougainville with H.M. Forces, as Scientific Liaison Officer, investigating the deterioration of dental and medical supplies in the tropics.

CORRESPONDING MEMBERS TO THE COUNCIL

In 1946 Dr. Worner was granted a Travelling Fellowship by the Commonwealth Department of Health, which enabled him to visit centres of academic and metallurgical interest in Britain, Switzerland, and the United States. While abroad he was appointed to succeed Professor Greenwood in the Chair of Metallurgy at Melbourne. This post he held until the present year, when he was appointed Director of Research to the Broken Hill Proprietary Co., Ltd.

Professor Worner is a member of numerous scientific and technical societies and has been prominent in the affairs of the Australian Institute of Metals.

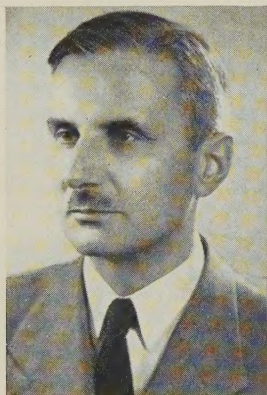
Austria

Professor Dr. E. Schmid

After graduating from the University of Vienna in 1920, Dr. Erich Schmid undertook research, in collaboration with Dr. M. Polanyi, at the Kaiser-Wilhelm Institut, Berlin, into the physical properties of metal crystals, being particularly interested in plasticity.

In addition to his researches into fundamental aspects of physical metallurgy, which he began at the Kaiser-Wilhelm Institut, continued at Fribourg (Switzerland), and is now pursuing at Vienna University, Professor Schmid has had wide experience of industrial metallurgy with Metallgesellschaft A.G., Frankfurt/Main, and Vacuumschmelze A.G., Hanau. Since 1951 he has been Professor of Physics at the University of Vienna. He is a Member of the Austrian Academy of Sciences and a Foreign Member of the Max-Planck-Institut für Metallforschung, Stuttgart.

Professor Schmid has published about 140 papers, dealing with a wide range of metallurgical subjects, and is part-author of two books: "Kristallplastizität" (with W. Boas), published



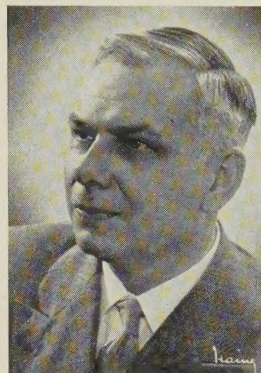
in 1935, and "Gleitlager" (with R. Weber) published in 1953. At the Paris Exhibition of 1937, he was awarded a Grand Prix in recognition of his contributions to crystal physics.

Belgium

Professor R. E. de Strycker

Robert Emile de Strycker was born at Antwerp in 1903 and educated at the Notre Dame College there. He studied mining engineering at Louvain University, obtaining his degree in 1927. He was appointed a C.R.B. Fellow and spent two years at Stanford University (U.S.A.), where he received degrees in mining engineering and metallurgical engineering in 1929.

On his return to Belgium, he was for a time an engineer with the Société Générale des Minerais and then was appointed Lecturer in ore-dressing and non-ferrous metallurgy at Louvain University in 1930. In the following year he was entrusted with the organization of a Department of Metallurgy there, and in 1932 was appointed Professor of Metallurgy, a position he still holds. He was Dean of the School



of Engineering in 1950-52 and will fill the same office, as well as that of Dean of the Faculty of Sciences, in 1955-56.

Professor de Strycker was consultant to the Belgian Ministry of Economic Affairs in regard to economic problems connected with non-ferrous metals before the Second World War, and during the War he was head of the Technical Division of the Non-Ferrous Metals Allocation Board.

His published research work deals mainly with the creep and relaxation of steels at room temperature. Other recent publications are concerned with the yielding of steel and the application of ion-exchange resins to hydrometallurgy. He has also published numerous annual reviews of economic aspects of metals.

Professor de Strycker is a Member of the Board and of the Executive Committee of the Institut pour l'Encouragement de la Recherche Scientifique dans l'Industrie et l'Agriculture, President of the Belgian Group for the Study of Prestressing, Member of the National Committee for Crystallography, and of the Technical Committee of the Tin Research Institute. He is a director of several companies and is permanent consulting engineer to four other companies in the field of metal production and fabrication. He is an Officer of the Ordre de Léopold and of the Ordre de la Couronne.

Brazil

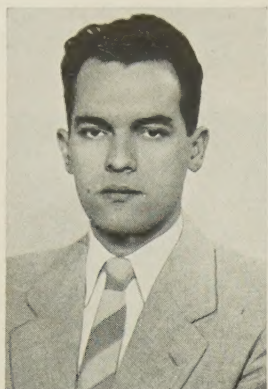
Dr. L. C. Corrêa da Silva

Luis Coelho Corrêa da Silva was born at São Paulo in 1920 and graduated in mining and metallurgical engineering at the Escola Politécnica, University of São Paulo. He joined the Metallurgy Department of the Instituto de Pesquisas Tecnológicas in 1942 as a Student-Assistant, and after graduation in 1944 continued to work there on problems connected with steelmaking and ferrous and non-ferrous foundry practice.

In 1946 Dr. Corrêa da Silva went to the United States and for several years carried out research work under Professor R. F. Mehl at the Carnegie Institute of Technology, Pittsburgh, Pa. For this he received the Sc.D. degree in 1950. In that year he returned to Brazil and organized a Research Laboratory at the Instituto de Pesquisas Tecnológicas. Here he worked on research and development problems, principally connected

CORRESPONDING MEMBERS TO THE COUNCIL

with nodular cast iron and diffusion in metals, until in 1954, he joined, as Chief Engineer, a new firm, Brassinter S.A., which is to manufacture powder-metal products.



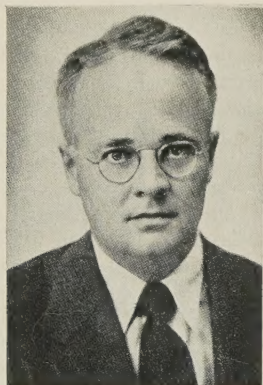
He has been a Member of Council of the Associação Brasileira de Metais since 1953 and served as first secretary during the 1954 session.

Canada

Dr. G. S. Farnham

Gordon Stuart Farnham is a graduate of Queen's University (B.A. 1929, B.Sc. 1931, M.Sc. 1932) and of Manchester University, where he was awarded a Ph.D. degree in 1934. He then went to Canada, and for the next two years he was a research metallurgist on the staff of the Ontario Research Foundation.

In 1936 Dr. Farnham joined the staff of the Bureau of Mines, eventually becoming Chief of the Physical Metallurgy Division.



During the war years he also worked part-time for the British Commonwealth Scientific Office in Washington. He left Government service in 1946 to join the International Nickel Company of Canada, Ltd., where he is now Assistant Manager in charge of Development and Research.

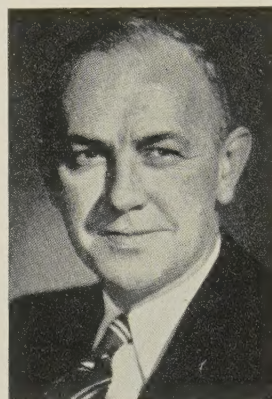
Dr. Farnham is a member of several British, Canadian, and United States scientific societies.

Professor F. A. Forward

Frank Arthur Forward was born in 1902 at Ottawa, where he was educated at the Model School and Collegiate Institute. He then went to the University of Toronto, graduating B.A.Sc., with honours in Chemical Engineering, in 1924.

During the next five years Mr. Forward held various positions with the Consolidated Mining and Smelting Company of Trail, B.C. In 1929 he went to Australia, where he spent another five years with Mount Isa Mines, Ltd., Mt. Isa, Queensland. Since 1953 he has been on the staff of the Department of Mining and Metallurgy at the University of British Columbia, Vancouver, first as Assistant Professor, then as Associate Professor, and, since 1945, as Professor and Head of the Department. From 1941 to 1945 he served also as Technical Director of the British Columbia War Metals Research Board.

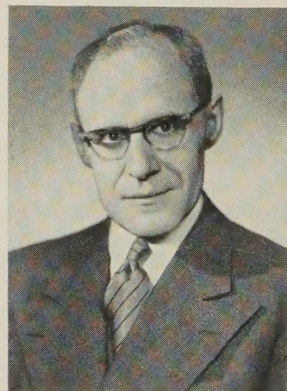
While at the University, Professor Forward has undertaken a number of consulting assignments, both in Canada and overseas. One of the most important of these, on which he has been engaged in the last few years, is the development of an ammonia-leaching process for the treatment of nickel ores.



This process formed the subject of an interesting lecture which Professor Forward gave to the London Local Section of the Institute in November 1953 and which was subsequently published in the *Bulletin* (1954, 2, 113).

Professor G. Letendre

Gerard Letendre was born at St. Germain, Quebec, and educated at a number of universities, gaining a B.A. (Hons.)



degree at Montreal, B.Eng. (Hons.) at McGill, D.I.C. at Imperial College, and Ph.D. of London University. After working for a time as an engineer in the Federal Department of Mines, he joined the staff of Laval University, Quebec, as a lecturer in metallurgy; subsequently he was appointed Professor of Metallurgy and placed in charge of the mining

CORRESPONDING MEMBERS TO THE COUNCIL

and metallurgical engineering courses. He is also senior partner in the firm of Letendre, Monti and Associates, consulting engineers.

Professor Letendre has visited American universities and metallurgical plants with a Carnegie Foundation grant, and a Nuffield Foundation Fellowship in Extractive Metallurgy has enabled him to visit universities and plants in a number of European countries, including Britain.

During the Second World War, Professor Letendre was consultant to the Inspection Board of the United Kingdom and Canada, and, for two years after the war, Province of Quebec supervisor for the Research and Development Division of the Department of Reconstruction and Supply. He is a member of the Materials Research Panel of the Department of National Defence and is Director of the Quebec Board of Trade.

Chile

Professor J. Païdassi

Jean Païdassi was born in 1915 and studied at the Ecole Nationale Supérieure des Mines in Paris, where he specialized in metallurgy. At the same time he obtained his degree at the Sorbonne. In 1943 he was engaged by the Société des



Acéries de Longwy by whom he was sent to work for a time at the Vitry laboratories of the Centre National de la Recherche Scientifique, under the direction of Professor J. Bénard.

In 1947 M. Païdassi was appointed to his present post of Professor of Metallurgy at the University of Concepción. Here he has worked for several years on the oxidation of metals at high temperatures, and last year he submitted a thesis on the oxidation of iron to the Sorbonne.

Denmark

Dr. B. Lunn

Børge Lunn was born in 1912 at Copenhagen, where he attended the Royal Technical College, receiving his M.Sc. in Chemical Engineering and Metallurgy in 1935. After two years as foundry engineer with the firm of Diesel-engine builders Frichs of Aarhus, he joined Paul Bergsøe and Søn, metal smelters, Copenhagen, as chief metallurgist. In 1950 he developed a high-strength non-magnetic alloy ("Galathea bronze") for use by the Danish deep-sea expedition.

From 1950 to 1952 he was Professor of Metallurgy at the Royal Technical College, Copenhagen, and received his doctor's degree in 1952 for a thesis on bearing metals and

lubricants. Since 1953 he has been Vice-President and Technical Director of the Non-Ferrous Rolling Mill and the Steel Wire Mill of the Northern Cable and Wire Works, Ltd., Copenhagen.



Dr. Lunn was President of the Danish Society for Metals in 1950-53 and is now Vice-President. He has read papers on metallurgical subjects in Denmark, Sweden, Norway, and the U.S.A., and has published communications in Danish, Swedish, Norwegian, German, English, and American journals.

Finland

Professor H. M. Miekk-oja

Heikki Malakias Miekk-oja was born in 1908 at Tampere. He was educated there and at the University of Helsinki, where he graduated in mathematics, physics, and chemistry in 1932, and subsequently gained a Ph.D. degree (1944). From 1933 to 1945 he was an assistant, and later an inspector, at the Bureau of Standards in Helsinki. Between 1939 and 1944 he saw service in the Finnish army as a lieutenant.

In 1945 Dr. Miekk-oja became Head of the Research Laboratory of the Outokumpu Metal Works at Pori. He remained there until 1950, when he was appointed to his present post as Professor of Physical and Engineering Metallurgy at the Finnish Institute of Technology.



Dr. Miekk-oja was Chairman of the Finnish Copper Committee 1949-54, Chairman of the Physical Society of Finland in 1953, and Chairman of the Metallurgical Section of the Finnish Mining Society 1953-55. He has published a number of papers, mostly dealing with copper alloys and

CORRESPONDING MEMBERS TO THE COUNCIL

steels; one on brasses appeared in the *Journal* of the Institute in 1952. His present research work is concerned chiefly with discontinuous precipitation phenomena.

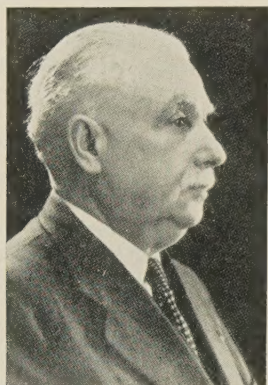
France

Professor G. Chaudron

Georges Chaudron was born in 1891. He studied at the Sorbonne, carrying out the work for his doctor's thesis in the laboratory of the famous chemist and metallurgist, Henry Le Chatelier. After serving in the 1914-18 war as an artillery officer, he was appointed, in 1921, deputy director of the mineral chemistry laboratory at the Collège de France. In 1928 he became Professor of Applied Chemistry and Director of the Institute of Applied Chemistry at the University of Lille.

In 1939 Professor Chaudron was appointed to his present posts of Professor of Applied Chemistry at the Sorbonne and Director of the laboratory which had just been built by the Centre National de la Recherche Scientifique at Vitry-sur-Seine.

Professor Chaudron's research work has been mainly in the fields of mineral chemistry and metallography. He has been responsible for establishing diagrams representing the equilibria between hydrogen, carbon monoxide, and the oxides of iron,



which constitute the theoretical bases of numerous metallurgical processes, including that of the blast furnace. He will be best known to members of the Institute of Metals for his work on corrosion, surface states, new aluminium alloys, and metals of high purity. As a result of this last work, he has been appointed permanent consultant in metallurgy to the French Atomic Energy Commission.

At the meeting of the Institute of Metals held in Paris in September 1949, Professor Chaudron delivered the Autumn Lecture on "Recent French Investigations in the Field of Light Alloys", in which he dealt particularly with the metallographic studies carried out at the Vitry laboratory.

Professor Chaudron was recently elected a member of the Académie des Sciences (Chemistry Section).

Dr. J. F. G. Hérenghuel

Jean François Germain Hérenghuel was born at Lens in 1909 and studied at the University of Lille. In 1931 he began work, under the direction of Professor Chaudron and on behalf of the Ministère de l'Air, on the purification of magnesium and calcium by vacuum sublimation and remelting under argon. This work was successfully brought to a semi-industrial scale, and for a thesis on it M. Hérenghuel was awarded the degree of Docteur ès Sciences of the University of Lille. He then joined the Société des Tréfileries et Laminoirs

du Havre as an engineer at the Le Havre plant. Here he worked in the foundry and in the laboratory on improving the manufacture of aluminium-magnesium alloys and perfecting techniques for the melting and fabrication of magnesium



and its alloys. He also began research into the properties of high-strength alloys of the aluminium-zinc-magnesium type.

In 1939 Dr. Hérenghuel was called up as an artillery officer. Subsequently he was attached to the Vitry laboratories of the Centre National de la Recherche Scientifique, where, again under Professor Chaudron, he continued his work on high-strength alloys. At the end of the war he was entrusted with the establishment of the Centre de Recherches d'Antony which serves the Société des Tréfileries et Laminoirs du Havre and the Compagnie Française des Métaux. As Director of this Centre, Dr. Hérenghuel has been concerned with problems relating to the surface condition and treatment of light alloys, corrosion-resisting alloys, and the fabrication of aluminium, magnesium, and copper alloys. He and his team of research workers have published numerous papers on these subjects. He also lectures on light metals at the Institut Supérieur des Matériaux.

Germany

Professor Dr.-Ing. P. Brenner

Paul Brenner was born in 1897 at Stuttgart. From 1919 to 1923 he studied at the Technische Hochschule there, graduat-



ing Dipl.Ing. Between 1923 and 1936 he was engaged at the Deutsche Versuchsanstalt für Luftfahrt (DVL) at Berlin-Adlershof, first as assistant to the Director, Professor Dr.-Ing.

W. Hoff, and later as Head of the Materials Research Laboratory. After publishing a number of papers on problems of aerodynamics and strength of materials, he devoted himself to research on materials and wrote many papers on metallic and non-metallic materials. In 1928 he was awarded the degree of Dr.-Ing. by the Technische Hochschule, Berlin-Charlottenburg, for a thesis on light metals.

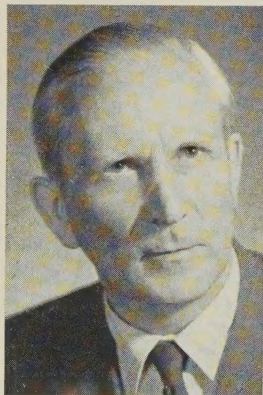
In 1936 Dr. Brenner was appointed Director of the Research Department of Vereinigte Leichtmetalle-Werke G.m.b.H., Hanover. Between 1946 and 1948 he was in Britain, carrying out research work at the Royal Aircraft Establishment, Farnborough. On returning to Germany he became Director of Research to Vereinigte Aluminium-Werke A.G. and Vereinigte Leichtmetall-Werke G.m.b.H., Bonn, the position he now holds.

Since 1941 Dr. Brenner has also lectured on light metals at the Technische Hochschule, Hanover. He has been President of the Deutsche Gesellschaft für Metallkunde since 1953.

Professor Dr. phil. W. Köster

Werner Köster was born in Hamburg in 1896. After serving as an officer in the First World War, he studied physical chemistry at the Universities of Freiburg and Göttingen, where he was a pupil of Tammann. After graduating in 1922, he carried out research on iron and steel at the Kaiser-Wilhelm Institut für Eisenforschung in Düsseldorf. He then gained experience of the non-ferrous metals while metallographer with the Schweizerische Metallwerke Selve und Co., Thun (1924-27). Between 1927 and 1933 he worked in the Research Department of Vereinigte Stahlwerke A.G., Dortmund, first on iron age-hardenable by addition of carbon and nitrogen and later on the development of carbon-free age-hardenable permanent-magnet alloys.

After a short period as Head of the Research Department of the Deutsche Edelstahlwerke A.G., Krefeld, Dr. Köster



was appointed Professor of Metallurgy at the Technische Hochschule, Stuttgart, and Director of the Kaiser-Wilhelm Institut für Metallforschung (now the Max-Planck Institut). Here his research work has been concerned mainly with the constitution of binary and ternary alloys, the elastic and anelastic properties of alloys, the interpretation of ageing processes, and magnetic materials.

The Deutsche Gesellschaft für Metallkunde, of which Professor Köster is a Member of Council, appointed him Editor of the *Zeitschrift für Metallkunde* in 1936 and awarded him the Heyn Medal in 1952.

India

Mr. G. C. Mitter, O.B.E.

Ganes Chandra Mitter was born in 1897 and educated at St. Xavier's College, Calcutta, and Calcutta University, where he obtained a B.Sc. degree with honours (1918) and M.Sc. (1920). From 1920 to March 1922 he held the Sir R. B. Ghosh Postgraduate Research Scholarship in Applied Chemistry. Then, after a period of training at the Royal Mint in London, Mr. Mitter was appointed Deputy Assay Master to the Government of India, being the first Indian to hold this post at the



Bombay Mint. In 1932 he was made Chief Assayer of the Indian Mints, a position he held until 1947. During this period Q (quaternary) alloy coinage was introduced and a very large coinage programme was undertaken in the war years.

From 1947 to 1952 Mr. Mitter was Chief Technical Adviser to the Indian Ministry of Finance, in which capacity he was entrusted with the planning of a refinery capable of recovering silver from quaternary alloy coins so that 225 million ounces of Lease-Lend silver might be returned to the United States. Since 1952, he has been Master of the Assay Department and Silver Refinery Project, being responsible for setting up a refinery to operate a new process of which he is joint inventor.

Mr. Mitter has visited Britain three times since the war to study metallurgical progress, particularly in silver refining. He was President of the Bombay Metallurgical Society in 1949-50 and President of the Indian Institute of Metals in 1954.

Professor D. Swarup

Daya Swarup was born in 1904 and graduated in metallurgy from the Banaras Hindu University in 1928. Soon afterwards he joined the staff of the University, and was awarded by the Government of Uttar Pradesh a scholarship which enabled him to travel to Germany for works' training and to England for advanced studies. He undertook research work at Sheffield University and was the first Indian to be awarded the Ph.D. degree there (1936).

Dr. Swarup subsequently became Professor of Metallurgy and Principal of the College of Mining and Metallurgy at the Banaras Hindu University. He is also an active member of the governing or advisory bodies of a number of professional and national institutions in India, and he has been a pioneer in the writing of metallurgical books in Hindi. His "Dhatu Vigyan" (Metallurgy) and "Audyogic Indhan" (Industrial Fuels) both received prizes, and he has also been awarded a

CORRESPONDING MEMBERS TO THE COUNCIL

bronze medal by the Mining, Geological, and Metallurgical Institute and Greave's Silver Medal.

A Nuffield Travelling Fellowship in Extractive Metallurgy enabled Professor Swarup to make extensive visits to Britain,



Canada, and the United States in 1948. In 1953, as a Government of India Delegate to the Fifth Empire Mining and Metallurgical Congress, he visited the most important mining and metallurgical plants in Australia.

Italy

Dr. Aldo Daccò

Aldo Daccò, who was born in Gaggiano (Milan) in 1896, devoted the early years of his business life to the manufacture of motor cars and motor boats. He piloted the boats himself and at one time held a number of world records.

Dr. Daccò then began his metallurgical activities, studying the problems connected with the characteristics of bearing alloys which had to meet the requirements of the engines of his racing boats. In 1937 he started a new business of his own, LIASA, with foundries, engineering works, and research laboratories. He personally directs researches, which are mostly concerned with bearing metals: his most interesting studies are on zinc-aluminium-copper alloys, alloys with a low content of tin and high content of lead, lead-bronzes,



corrosion-resistant bronzes, and the electrodeposition of lead-indium and lead-tin alloys as overlays on bearings. He has taken out several industrial patents relating to metal alloys and their applications.

Dr. Daccò was one of the founders of the Associazione Italiana di Metallurgia, and has been its President since 1947.

He is also President of the Commissione Sportiva of the Automobile Club of Milan, and Member of the Management Committee of the Associazione Tecnici dell'Automobile.

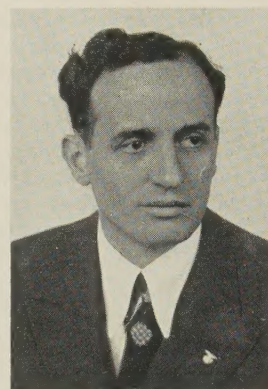
In 1955, in acknowledgement of his contributions in the metallurgical field, he was awarded an honorary doctorate in Chemistry by the University of Ferrara, and has been made an honorary life member of the American Society for Metals.

Professor L. Matteoli

Leno Matteoli was born at Leghorn in 1905, and graduated in chemistry from the University of Pisa in 1927.

After holding the appointment of Laboratory Chemist at the Fornaci di Barga works of the Società Metallurgica Italiana, he became Chief of the Chemical and Metallographical Laboratory. In 1931 he was awarded the Ernesto Breda Scholarship and took a year's course of study and metallurgical and metallographic research at the Istituto Scientifico Tecnico Ernesto Breda. On rejoining the staff of the Società Metallurgica Italiana in 1933, he was appointed Chief of the Central Research Laboratory.

In 1935 Dr. Matteoli was engaged by the Società Italiana Ernesto Breda for duty at the Istituto Scientifico Tecnico Ernesto Breda, of which he became Deputy Director in 1945.



In 1954 Professor Matteoli was appointed to the managerial staff of the Centro di Ricerche Metallurgiche, Torino, a recently founded organization for research in the field of non-ferrous metals.

From 1940 to 1945 Professor Matteoli was Lecturer in Metallurgy and Metallography at Bologna University, and since 1950 he has been Lecturer in the Science of Metals at Ferrara University. In 1954 he was officially qualified for university teaching of metallurgy and metallography.

Professor Matteoli is the author or joint author of more than 40 scientific papers, lectures, and articles on many subjects relating to steels, copper, bronzes, and bronzes. He has written also a book on metallography, published by the Associazione Italiana di Metallurgia.

He is Secretary to the Council of the Associazione Italiana di Metallurgia and a member of various Italian standardizing committees for metals. He is also a Member of Council of the Istituto Italiano della Saldatura.

Japan

Professor I. Obinata

Ichiji Obinata was born at Tokyo in 1902. He was educated at the Fourth High School, Kanazawa, and in the Department of Engineering of Tokyo Imperial University, from which

CORRESPONDING MEMBERS TO THE COUNCIL

he graduated in 1926. He subsequently obtained the Dr.-Eng. degree of Tokyo University for a thesis on the nature of the eutectoid transformation of aluminium bronzes.

Between 1927 and 1940 Dr. Obinata was first Assistant Professor and afterwards (1934) Professor of Metallurgy at



the Ryojun College of Engineering, Port Arthur, Southern Manchuria. During this period he spent almost two years touring countries in Europe and studying metallurgical topics.

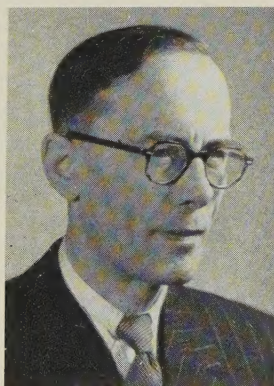
Since 1940 he has held his present post of Professor in the Research Institute for Iron, Steel, and Other Metals at Tohoku University, Sendai. From 1944 to 1954 he was also Professor of Metallurgy at Tokyo University.

Professor Obinata is the author of a large number of scientific papers and of four books dealing with X-ray metallography (1939), age-hardening (1940), Duralumin (1943), and (with S. Terezawa) the microstructure of light alloys (1944). He is a Member of Council of the Japan Institute of Metals and a member of numerous other societies.

The Netherlands

Professor Dr. W. G. Burgers

Wilhelm Gerard Burgers was born at Arnhem in 1897. He studied chemistry at Leyden University from 1917 until 1919. He then became a demonstrator in organic chemistry under Professor Dr. H. J. Backer at Groningen University.



After a stay in Rome between 1920 and 1922, he went back to Groningen until 1924, when he went to work for three years under Sir William Bragg at the Royal Institution in London. He was assisted first by a Fellowship of the Inter-

national Education Board of the Rockefeller Foundation and subsequently by a Ramsay Memorial Fellowship. For the work carried out at the Royal Institution on the X-ray study of the structure of organic compounds, he was in 1928 awarded a doctorate at Groningen University.

From 1927 to 1940 Dr. Burgers was a research worker in the Physical Laboratory of the N. V. Philips Works at Eindhoven; here he applied X-rays to the investigation of the structure of matter and also studied the recrystallization of metals. In 1940 he was appointed Professor of Physical Chemistry at the Technische Hogeschool, Delft, a position which he has held ever since. His work here has been in the fields of metal physics (in particular recrystallization) and electrochemistry.

He spent a semester (1949-50) as Visiting Professor in the Department of Physics at Purdue University, Lafayette, Ind. In 1952 he was elected a member of the Royal Academy of Science at Amsterdam.

Norway

Professor A. B. Winterbottom

Arthur Baker Winterbottom was born at Manchester in 1904 and studied applied chemistry and metallurgy at the College of Technology. He obtained the B.Sc. Tech. degree



with First Class Honours in 1924 and the M.Sc. Tech. degree in 1926; in this latter year he also obtained the Higher National Certificate in Mechanical Engineering.

From 1925 to 1927 Mr. Winterbottom was Demonstrator in Applied Chemistry at the College of Technology, Manchester, and was then for two years a Research Assistant with Ferranti, Ltd., being mainly concerned with domestic-heating applications of electricity. In 1929 he became Senior Assistant in the Research Department of Tube Investments, Ltd., where he remained until in 1934 he went to the Norges Tekniske Høgskole, Trondheim, to carry out optical studies of the oxidation of metals under the late Professor Tronstad.

After the invasion of Norway in 1940, Mr. Winterbottom was interned for some time in Germany before, in 1943, he was exchanged. On his return to Britain he spent two years as a Senior Investigator on the staff of the British Non-Ferrous Metals Research Association, dealing mainly with corrosion problems. From 1945 to 1948 he was Lecturer in Electrometallurgy at the University of Manchester; he was then appointed Reader in Metallography at the Norges Tekniske Høgskole. In 1951 he was a member of O.E.E.C. Mission No. 80 to the United States, and while there he

CORRESPONDING MEMBERS TO THE COUNCIL

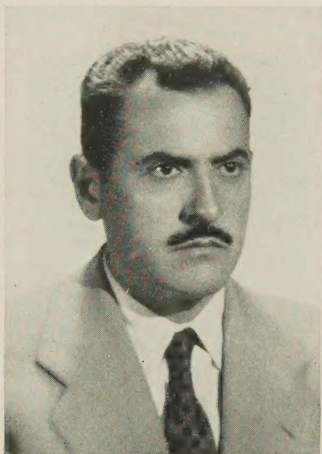
participated in the World Metallurgical Congress held in Detroit. Two years later he was seconded for a time to U.N.E.S.C.O. and was attached to the Engineering College at Dacca, East Pakistan.

Mr. Winterbottom has recently been appointed Professor of Physical Metallurgy at the Norges Tekniske Høgskole and has been awarded the degree of Doctor Technicae for a thesis on "Optical Studies of Metal Surfaces".

Spain

Señor F. Torras Serrataco

Francisco Torras Serrataco was born in 1914 and was trained at the Special School for Industrial Engineers in Madrid. He served as a Captain in the Artillery during the Spanish Civil War (1936-39). From 1939 to 1940 he belonged to the Official Corps of Industrial Engineers of the Ministry of Industry, and since 1940 he has been General Manager of Minero Metalúrgica del Estano, S.A.E., Madrid. From 1940 to 1943 he was also National Secretary of the National Metallurgical Syndicate; from 1943 to 1944, Head of the Industrial Section of the National Delegation of Syndicates; and from



1943 to 1947 he was President of the Sociedad Minera Española de Galicia, S.A., Madrid. Since 1953 he has been Counsellor-Delegate of the Sociedad Minera y de Obras Públicas, Minas de Presqueiras, S.A., Madrid.

Señor Torras Serrataco took an active part in the Second National Engineering Congress held in Spain in 1950; he was Secretary of the Committee on the study and exploitation of mineral deposits and a member of the Committee on the iron and steel industry in Spain. He has contributed a number of articles on tin and tungsten to economic and technical journals.

Sweden

Professor E. G. Rudberg

Erik Gustaf Rudberg was born in Stockholm in 1902. He studied Chemistry and Physics at Stockholm University, where he became Lecturer in Physics in 1929. He carried out research work in physics at the University of Göttingen in 1924, as a Ramsay Memorial Fellow at King's College, London, from 1925 to 1927, and as a Rockefeller Foundation Fellow at Bartol Research Laboratory, Swarthmore, U.S.A., from 1930 to 1931. He then joined the Massachusetts

Institute of Technology, where he held the appointment of Assistant Professor of Physics from 1932 to 1936.

Returning to Sweden he worked as a Research Physicist with the Swedish General Electric Co. (ASEA) until 1940,



when he became Professor and Head of the Physics Department at the Chalmers Institute of Technology, Gothenburg. He took up his present appointment as Director of the Metallografiska Institutet, Stockholm, in succession to the late Gösta Phragmén, in 1945. Professor Rudberg's earlier work was concerned with electron emission, electron theory of metals, vapour pressure, and reaction velocity. In recent years he has been interested in the reactions associated with solidification in cast iron.

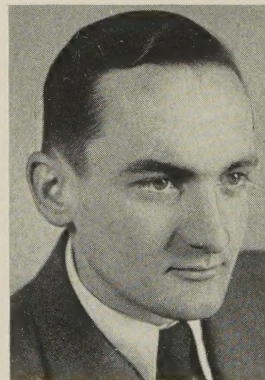
Professor Rudberg is a member of the Royal Engineering Academy and of the Royal Academy of Science.

Switzerland

Dr. O. H. C. Messner

Otto Hans Caspar Messner was born at Zürich in 1917 and spent his childhood at Thun, where his father, Colonel Messner, held the position of Managing Director of the Schweizerische Metallwerke Selve und Co., Thun.

On leaving Glarisegg College, he took up the study of non-ferrous metallurgy at the Technische Hochschule, Aachen. At the same time he also gained practical experience in various metallurgical companies, including 8 months' work in England with Imperial Chemical Industries, Ltd.,



Metals Division, and Henry Wiggin and Co., Ltd. In 1946 he obtained his doctor's degree at the Federal Institute of Technology (Zürich) for a thesis on creep phenomena in zinc and zinc alloys.

CORRESPONDING MEMBERS TO THE COUNCIL

Dr. Messner joined the staff of the Metallwerke A.G., Dornach, in 1940 as works metallurgist and was engaged mainly on war-time development work on zinc alloys, the use of steel for cartridge-case manufacture, and researches in the aluminium field. (During that time he also carried out the experimental work which was to serve as a basis for his thesis.)

In 1946 he spent 6 months in the U.S.A. studying industrial developments during the war years, and on his return took up consulting work in addition to research work in the field of non-ferrous metal forming. Dr. Messner was appointed a lecturer at the Eidgenössische Technische Hochschule, Zürich, in 1951.

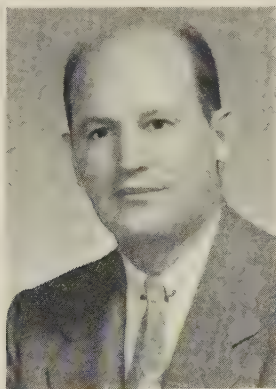
Besides editing two Swiss non-ferrous metal journals, *Pro-Metal* and *Aluminium Suisse*, he is Chairman of Controlcol, A.G., and on the board of the Metallwerke, A.G., Dornach, and other Swiss companies.

United States of America

Professor Morris Cohen

Morris Cohen studied at the Massachusetts Institute of Technology, from which he received the Sc.B. (1933) and Sc.D. (1936) degrees. He became Instructor in Metallurgy there in 1936 and was subsequently appointed Assistant Professor (1937), Associate Professor (1941), and Professor of Physical Metallurgy (1946). During the Second World War he was Associate Director of the Manhattan Project at M.I.T.

Professor Cohen was a joint recipient of the Howe Medal of the American Society for Metals in 1945 and 1949. He also received the Sauveur Memorial Award of the Boston Chapter of the A.S.M. in 1947 and the Institute of Metals Award of the American Institute of Mining and Metallurgical Engineers in 1950. In 1948 he delivered the Campbell Memorial Lecture of the American Society for Metals. He



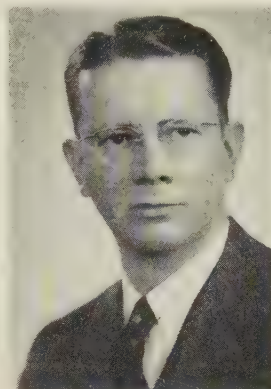
received the Kamani Medal of the Indian Institute of Metals in 1952 and the Mathewson Gold Medal of the A.I.M.M.E. in 1953.

Professor Cohen is a Fellow of the American Academy of Arts and Sciences and a member of numerous scientific societies. He was Chairman of the Institute of Metals Division of the A.I.M.M.E. in 1953 and is Chairman of the Boston Chapter of the A.S.M. As regards research work, he has been active in the fields of metallography, heat-treatment, phase transformations, solid-state thermodynamics and diffusion, tool steels, and age-hardening.

Professor R. F. Mehl

Robert Franklin Mehl was born at Lancaster, Pa., in 1898. He was educated at Franklin and Marshall College, Lancaster, Pa., where he graduated B.S. in 1919, and Princeton University (Ph.D., 1924).

On leaving Princeton he was successively Head of the Department of Chemistry, Juniata College (1923-25), National Research Fellow at Harvard University (1925-27), Superintendent of the Division of Physical Metallurgy, Naval Research Laboratory, Washington, D.C. (1927-31), and



Assistant Director, Research Laboratories, The American Rolling Mill Company, Middletown, O. (1931-32). In 1932 he was appointed Director of the Metals Research Laboratory and Professor of Metallurgy at the Carnegie Institute of Technology, Pittsburgh, Pa., and in 1935 was also made Head of the Department of Metallurgical Engineering. These positions he still holds. He has served as consultant to many American companies, and has acted as consultant and court expert in various patent trials.

Professor Mehl has published more than 100 papers on a wide range of metallurgical subjects, and he is the editor of the *Metallurgy and Metallurgical Engineering Series* of text-books published by the McGraw-Hill Book Co., Inc. He translated Professor Tammann's book "The States of Aggregation" ("Aggregatzustände") (D. Van Nostrand Company, 1925) and is the author of "Metallurgy of Iron and Steel" (published in Portuguese in São Paulo, Brazil, in 1944) and of "History of Physical Metallurgy" (American Institute of Mining and Metallurgical Engineers, 1947).

Professor Mehl is a member of numerous technical and scientific societies and a member of many committees. He has been Chairman of the Metallurgical Education Advisory Committee of the American Society for Metals; the Metallurgical Engineering Education Committee of the American Society for Engineering Education; and the Metallurgy Panel, Research and Development Board, National Military Establishment, Washington, D.C.

Among the honours he has received are the Prize certificate for the best scientific papers published in the *Transactions* of the Institute of Metals Division of the American Institute of Mining and Metallurgical Engineers (1934, 1939, 1943, 1944, 1947); the John Scott Medal, certificate, and prize award for the development of gamma-ray radiography (1934); the Howe Medal of the American Society for Metals (1939); Medallist of the American Industrial Radium and X-Ray Society (1943); Medallist of the Associação Brasileira de Metais (1944); and the James Douglas Gold Medal of the American Institute of Mining and Metallurgical Engineers (1945).

PERSONAL NOTES

He has delivered numerous special lectures to scientific societies, including the Annual Institute of Metals Lecture of the American Institute of Mining and Metallurgical Engineers (1936); Twelfth Annual Priestley Lectures (five) at the Pennsylvania State College (1938); Campbell Lecture of the American Society for Metals (1941); Sauveur Lecture of the American Society for Metals (1940 and 1943); Special Lectures at the Universidade de São Paulo, Brazil (1943 and 1949); and the Hatfield Memorial Lecture of the Iron and Steel Institute (1948).

Professor Mehl has been the recipient of honorary doctorates from Franklin and Marshall College (1938), the Universidade de São Paulo, Brazil (1944), and Stevens Institute of Technology (1944).

Dr. R. A. Wilkins

Richard A. Wilkins was born in Massachusetts, in 1896, and graduated in Chemical Engineering from the Massachusetts Institute of Technology in 1918.

During the First World War he was in command of the Laboratory of the Offence Section, Development Division, Chemical Warfare Service. Subsequently, Dr. Wilkins was



Chemical Engineer in the Lynite Laboratories, Cleveland, O.; Assistant Professor of Chemical Engineering, Massachusetts Institute of Technology; and Vice-President, Industrial Development Corporation. In 1930 he joined Revere Copper and Brass, Inc., as Metallurgical Manager, later becoming Vice-President and Director of Research.

Dr. Wilkins is the author or co-author of many technical papers dealing with copper and brass and various metallurgical operations, and in 1943 he published, with Mr. E. S. Bunn, the well-known book "Copper and Copper-Base Alloys".

PERSONAL NOTES

MR. H. J. ALBERT has left the Massachusetts Institute of Technology, where he was awarded the D.Sc. degree in June, and is now a metallurgist in the Physical Research Department of Baker and Co., Inc., Newark, N.J.

DR. B. H. ALEXANDER has left Sylvania Electric Products, Inc., to become Manager of Semi-Conductor Operations for CBS-Hytron, Lowell, Mass.

MR. R. G. BELLAMY has left the National Smelting Co., Ltd., and joined the staff of the Metallurgy Division, Atomic Energy Research Establishment, Harwell.

MR. L. E. BENSON has been awarded the D.Sc. degree of Manchester University.

MR. D. J. BROWN has left Magnesium Elektron, Ltd., to take up the post of Works Metallurgist in the Non-Ferrous Department of Vickers-Armstrongs (Engineers), Ltd., Newcastle-upon-Tyne.

MR. R. J. BROWN has been appointed Materials Engineer to the British Motor Corporation, Ltd. He joined Morris Motors, Ltd., in 1929 and had been in charge of the Nuffield Central Research Laboratories, Coventry, since 1945.

MR. S. P. CASTLE is now Assistant Metallurgist with the Superheater Co., Ltd., Manchester.

MR. I. R. M. CHASTON has been appointed Assistant Metallurgist at the Laboo Mine of the General Mining and Agency Co., South Thailand.

PROFESSOR P. CHEVENARD is to be presented this month with the Osmond Medal of the Société Française de Métallurgie, in recognition of his many important contributions to metallurgy.

MR. A. R. COOK has been transferred from Aluminium Laboratories, Ltd., to the Northern Aluminium Co., Ltd., Banbury.

MR. B. DUCKFIELD has left the Steel Company of Wales, Ltd., to become an investigator on the research staff of the British Non-Ferrous Metals Research Association, London.

DR. O. W. ELLIS has recently been elected a Fellow of the American Society of Mechanical Engineers.

MR. D. N. FAGG has left the British Non-Ferrous Metals Research Association, where he had been in the Liaison Department since 1949, to take an appointment as Technical Officer with the Zinc Development Association.

DR. F. A. FOX has received the John Shearer Award of the Australian Institute of Metals for a paper presented to the South Australian Branch last year.

MR. J. E. FURMIDGE has left King's College, Newcastle-upon-Tyne, having obtained the B.Sc. (Hons. Met.) degree, and has taken a post with the Steel Company of Wales, Port Talbot.

DR. P. T. GILBERT has been appointed Deputy Chief Metallurgist to the Yorkshire Copper Works, Ltd., Leeds. He was previously Head of the Corrosion Section of the British Non-Ferrous Metals Research Association.

MR. V. GRIFFITHS has left the Massachusetts Institute of Technology and is now at the Department of Mining and Metallurgy, University of British Columbia, Vancouver, B.C.

MR. A. R. HEATH, an investigator in the Physics Section of the British Non-Ferrous Metals Research Association, has left to become Lecturer in Physics at Brighton Technical College.

MR. R. F. HUDSON is now Senior Metallurgist to Steelweld Pty., Ltd., West Footscray, Vic., Australia.

MR. P. E. G. HUNT has left the Midland Laboratory Guild (1928), Ltd., and is now with Wilmot-Breedon, Ltd.

MR. J. R. KNIGHT has left The Mond Nickel Co., Ltd., and joined Baker Platinum, Ltd., London.

HERR PAUL MELCHIOR has retired from the post of Manager of the Bundesanstalt für mechanische und chemische Materialprüfung, Berlin. He has not, however, retired from the position of Vice-President of the Fachnormenausschuss

LETTERS TO THE EDITOR

Materialprüfung, Berlin, as erroneously stated in the August issue of the *Bulletin*.

DR. M. K. PATWARDHAN has resigned his post as Assistant Professor of Mining and Metallurgy at Banaras Hindu University, to join the staff of the Indian Naval Chemical and Metallurgical Laboratory, Indian Naval Dockyard, Bombay.

MR. E. F. PELLOWE has left the Crittall Manufacturing Co., Ltd., and is now with Ideal Casements (Reading), Ltd., Reading.

DR. V. A. PHILLIPS has left the English Electric Co., Ltd., to take up a post as Lecturer in Metallurgy at Sheffield University.

MR. R. A. QUADT, Director of Research and Development, Aluminum Division, Hunter Douglas Corp., Riverside, Calif., has been appointed an Assistant Vice-President.

MR. W. M. SERVICE has left Mechans, Ltd., to become Sales Representative of R. B. Tennant, Ltd., Coatbridge.

MR. D. A. SUTCLIFFE has left the Royal Aircraft Establishment, Farnborough, and joined the scientific staff of Central Research Station No. 2 of the National Coal Board at Isleworth.

MAJOR P. LITHERLAND TEED has been appointed a Special Director of Vickers-Armstrongs (Aircraft), Ltd.

DR. W. S. TURPIN has left Hepworth and Grandage, Ltd., to take up an appointment as Company Metallurgist with the British Tabulating Machine Co., Ltd., Letchworth, Herts.

DR. K. R. VAN HORN, Director of Research to the Aluminum Company of America, has been awarded the honorary degree of Doctor of Science by the Case Institute of Technology, Cleveland, Ohio.

DR. R. WARD has been appointed Manager of the Industrial Heating Department of the General Electric Company, Shelbyville, Ind.

MR. A. J. WATKINS has joined the Research Department of Samuel Fox and Co., Ltd., Stocksbridge.

DR. D. WHITWHAM has left the British Oxygen Co., Ltd., and taken a post as metallurgist with Tréfileries et Laminoirs du Havre, Antony (Seine).

MR. J. S. WINSTON has been appointed Associate Professor of Metallurgy, Mackay School of Mines, University of Nevada, Reno, Nev. He was formerly Assistant Professor.

MR. J. G. WISTREICH has been appointed Deputy Head of the Mechanical Working Division of the British Iron and Steel Research Association, whilst continuing in his present capacity as Head of the Association's Metal Working Laboratories in Sheffield.

LETTERS TO THE EDITOR

Sigma Phases in Rhenium Alloys

One intermediate compound has been reported in the rhenium-tungsten system.¹ Recent work in this Laboratory on alloys of rhenium with tungsten or molybdenum has shown that an isomorphous compound exists in the molybdenum-rhenium system, and that both compounds have the sigma-phase structure.

Alloys were prepared by melting the high-purity metals together in an argon-arc furnace. In common with other

sigma phases, the alloys containing a high proportion of compound were extremely brittle. Powder patterns, taken with Cr K α radiation, were indexed satisfactorily on the basis of the tetragonal unit cell generally accepted for the sigma structure.² Parameter values (in true Å.) are given in Table I, together with the approximate range of homogeneity of the compounds.

TABLE I.

Composition	c, Å.	a, Å.	Homogeneity Range, at.-%
40 at.-% Mo, 60 at.-% Re	4.983	9.588	49-70% Re
40.5 at.-% W, 59.5 at.-% Re	5.038	9.645	55-65% Re

In the First Long Period, sigma phases are formed between vanadium and manganese, iron, cobalt, or nickel, and between chromium and manganese, iron, or cobalt.³ The formation of a rhenium-tungsten sigma phase is analogous, in the Third Long Period, with the chromium-manganese sigma phase, and it will be interesting to see whether this analogy of behaviour leads to the discovery of other sigma phases between tantalum or tungsten and later transition elements of the Third Long Period.

The writer wishes to thank Dr. G. A. Geach for his interest in the work and Dr. T. E. Allibone, F.R.S., Director of the Research Laboratory, Associated Electrical Industries, Ltd., for permission to publish this note.

A. G. KNAPTON

Research Laboratory,
Associated Electrical Industries, Ltd.,
Aldermaston, Berks.

REFERENCES

1. K. Becker and K. Moers, *Metallwirtschaft*, 1930, **9**, 1063.
2. W. B. Pearson and J. W. Christian, *Acta Cryst.*, 1952, **5**, 157.
3. W. B. Pearson, J. W. Christian, and W. Hume-Rothery, *Nature*, 1951, **167**, 110.

Constitution of Copper-Aluminium Alloys

In the August issue, West and Thomas¹ describe experiments with copper-aluminium alloys, and in their conclusions say: "The experimental evidence indicates the existence of an additional stable phase (provisionally designated X) in the copper-aluminium system". In 1937 I described experiments which indicated the existence of a new phase in the same system between β and γ , formed by a peritectic reaction.² Feeling myself to be a novice both in the Greek language and in the conventions of nomenclature of alloy systems, I also provisionally designated this new phase X, thinking that the experts would tidy it up. However, it has remained X to this day, and appears as such in the reference books, for example Smithells' "Metals Reference Book", and the A.S.M. "Metals Handbook". It seems, therefore, that West and Thomas should either take courage and find a Greek letter for it, or designate their phase provisionally, shall we say, Z.

A. G. DOWSON

Engelhard Industries, Ltd.,
Datchet, Bucks.

REFERENCES

1. D. R. F. West and D. L. Thomas, *J. Inst. Metals*, 1954-55, **83**, (12) 505.
2. A. G. Dowson, *ibid.*, 1937, **61**, 197.

OTHER NEWS

Protection of Cable Sheathing

A Symposium on the Protection of Cable Sheathing against Corrosion is being arranged by the Corrosion Group of the Society of Chemical Industry to take place on Friday, 18 November 1955, at the Institution of Electrical Engineers, Savoy Place, London, W.C.2. Five papers will be presented and discussed as follows:

- (1) "The 'Phenol Corrosion' of Lead", by R. L. Davies and E. L. Coles (British Insulated Callender's Cables, Ltd.).
- (2) "Cathodic Protection of Telecommunications Cables", by J. Gerrard and J. R. Walters (Post Office).
- (3) "The Protection of Buried Power Cables", by J. H. Gosden (Central Electricity Authority).
- (4) "The Behaviour of Aluminium-Sheathed Cables", by P. A. Raine (Johnson and Phillips, Ltd.).
- (5) "The Mechanism of Corrosion of Metal Pipes in Soils and Practical Methods of Prevention", by W. W. Robson and A. R. Taylor (Associated Lead Manufacturers, Ltd.).

Further details and forms of registration may be obtained from the Society of Chemical Industry, 56 Victoria Street, London, S.W.1.

Symposium on Corrosion, Melbourne

This Symposium, already announced in the July issue of the *Bulletin* (p. 270), will be held at the University of Melbourne from 28 November to 2 December 1955.

About 30 papers are to be presented; these will be pre-printed and subsequently published in a bound volume. The cost of registration and preprints is £1 10s.: of registration, preprints, and volume £2; and of the volume alone £1 10s.

Correspondence should be addressed to the Hon. Secretary, Symposium on Corrosion, Metallurgy Department, University of Melbourne, Carlton N.3, Vic., Australia.

Symposium on the "Production, Properties, and Applications of Alloy and Special Steels"

A Symposium on the "Production, Properties, and Applications of Alloy and Special Steels" is to be held on 1-3 February 1956 under the auspices of the National Metallurgical Laboratory, Jamshedpur.

The objects of the Symposium are: (1) to draw attention to the importance of developing the alloy steel industry in India along scientific lines; (2) to indicate to the engineering industries the need to rationalize their requirements and adopt specifications for alloy steels that can be made from Indian raw materials; (3) to define satisfactory grades of alloy steels based on such alloying elements as are indigenously available; and (4) to discuss the special equipment and practice required to produce these steels and the materials, including ferro-alloys, needed for their production.

Further details may be obtained from the Director, National Metallurgical Laboratory, Jamshedpur, India.

Visits to Elecfurn Works

Wild-Barfield Electric Furnaces, Ltd., announce that it will not be possible to arrange visits to their works at Watford during the coming winter season, owing to major extensions to the premises that are in progress. Visitors will be welcome again when the extensions are completed.

DIARY

Local Sections and Associated Societies

- 4 October. **Oxford Local Section.** "The Metallic Bond", by Professor C. A. Coulson. (Cadena Café, Cornmarket Street, Oxford, at 7.0 p.m.)
- 6 October. **Leeds Metallurgical Society.** "Vacuum Melting and Vacuum Heat-Treatment", by Dr. B. C. Woodfine. (Large Chemistry Theatre, University of Leeds, at 7.15 p.m.)
- 6 October. **London Local Section.** "Fatigue", by P. J. E. Forsyth. (4 Grosvenor Gardens, London, S.W.1, at 6.30 p.m.)
- 11 October. **South Wales Local Section.** "The Work at the British Non-Ferrous Metals Research Association", by G. L. Bailey (Department of Metallurgy, University College, Singleton Park, Swansea, at 6.45 p.m.)
- 12 October. **Manchester Metallurgical Society.** Presidential Address by C. J. Bushrod. (Lecture Room of the Central Library, Manchester, at 6.30 p.m.)
- 13 October. **Liverpool Metallurgical Society.** Presidential Address by A. E. Griffin. (Liverpool Engineering Society, The Temple, Dale Street, Liverpool, at 7.0 p.m.)
- 17 October. **Sheffield Local Section.** "The Manufacture of Steel Tubes", by E. Lister. (Engineering Lecture Theatre, The University, St. George's Square, Sheffield 1, at 7.30 p.m.)
- 18 October. **North East Metallurgical Society.** "The Use of Radioactive Isotopes in Metallurgical Research", by Dr. Sylvia Makin. (Constantine Technical College, Middlesbrough, at 7.15 p.m.)
- 26 October. **Manchester Metallurgical Society.** "The Mechanism of Fatigue", by P. J. E. Forsyth. (Lecture Room of the Central Library, Manchester, at 6.30 p.m.)
- 1 November. **Oxford Local Section.** "Some Aspects of Bright Plating", by Dr. G. L. J. Bailey. (Cadena Café, Cornmarket Street, Oxford, at 7.0 p.m.)
- 3 November. **Birmingham Local Section.** "Radiation Damage in Metals", by Dr. W. M. Lomer. (James Watt Memorial Institute, Great Charles Street, Birmingham 3, at 6.30 p.m.)
- 3 November. **Leeds Metallurgical Society.** "Grain Boundaries", by Dr. D. McLean. (Large Chemistry Theatre, University of Leeds, at 7.15 p.m.)
- 3 November. **London Local Section.** "The Rare Earths", by A. R. Powell. (Royal School of Mines, South Kensington, S.W.7, at 7.0 p.m.)
- 8 November. **South Wales Local Section.** "The Effect of Trace Impurities on Iron", by Dr. N. P. Allen. (Department of Metallurgy, University College, Singleton Park, Swansea, at 6.45 p.m.)
- 9 November. **Manchester Metallurgical Society.** "Fuel-Fired Heating Furnaces", by Professor M. W. Thring. (Lecture Room of the Central Library, Manchester, at 6.30 p.m.)
- 11 November. **North East Metallurgical Society.** "Constructional Materials for the Heavy Chemical Industry", by F. H. Keating. (Cleveland Scientific and Technical Institution, Middlesbrough, at 7.15 p.m.)

- 14 November. Scottish Local Section.** "Some Problems with Materials for Gas-Turbine Engines", by K. Metcalfe. (Institution of Engineers and Shipbuilders in Scotland, 39 Elmbank Crescent, Glasgow, C.2, at 6.30 p.m.)
- 14 November. Sheffield Local Section.** "The Value of Non-Destructive Testing", by J. F. Hinsley. (Engineering Lecture Theatre, The University, St. George's Square, Sheffield 1, at 7.30 p.m.)

Other Societies

- 11 October. East Midlands Metallurgical Society.** Presidential Address: "The Development of the Research Department of British Railways", by E. D. Knight. (Nottingham and District Technical College, Shakespeare Street, Nottingham, at 7.30 p.m.)
- 12 October. Society of Chemical Industry, Corrosion Group.** "The Composition of Sprayed Aluminium Coatings", by Dr. F. A. Champion and G. W. Walkiden; "Sprayed Alloy Coatings", by Dr. T. P. Hoar. (Chemical Society, Burlington House, Piccadilly, W.1, at 6.30 p.m.)
- 25 October. Institution of Production Engineers, Oxford Section.** "Automation in the Aluminium Industry", by D. A. Ellis, followed by a film: "The Kittimat Story". (North Oxfordshire Technical College, Bath Road, Banbury, at 7.30 p.m.)
- 1 November. Institution of Engineers and Shipbuilders in Scotland.** "Aluminium Tanker", by Dr. E. C. B. Corlett. (39 Elmbank Crescent, Glasgow, C.2, at 7.30 p.m.)
- 2 November. Institution of Production Engineers, Peterborough Section.** "The Shell-Moulding Process", by D. N. Buttrey. (Campbell Hotel, Bridge Street, Peterborough, at 7.30 p.m.)
- 2 November. Institution of Production Engineers, South Essex Section.** "Powder Metallurgy", by G. R. Bell. (The Ilford Club, 21a Balfour Road, Ilford, at 7.30 p.m.)
- 11 November. Institution of Engineers and Shipbuilders in Scotland.** "Fatigue Research at the Mechanical Engineering Research Laboratory", by C. E. Phillips. (Joint meeting with the Aberdeen Mechanical Society.) (Robert Gordon's Technical College, Aberdeen, at 7.45 p.m.)

experience, and qualifications, either in the grade of Experimental Officer (minimum age 26, £755-£945 p.a.) or Assistant Experimental Officer (£310 at age 18-£685 p.a.). Minimum qualifications are Higher School Certificate in science subjects or General Certificate of Education "Advanced" level in at least two science subjects, or equivalent qualifications.

(d) To work on irradiation experiments with remote handling equipment, and to organize the irradiation of materials for the Division in the Harwell piles.

Appointments in this field will be made according to age, experience, and qualification, either in the grade of Senior Assistant (Scientific) (minimum age 27, £585-£800 p.a.) or Assistant (Scientific) (£235 at age 16-£550 p.a.). Normally minimum qualifications are School Certificate with credit in mathematics or a science subject, or General Certificate of Education "Ordinary" level in four subjects to include (i) English language and (ii) a scientific or mathematical subject, or equivalent qualifications. In exceptional cases, applicants without these qualifications, but with considerable mechanical or radioactivity handling technique experience, will be considered. The posts offer ample opportunity to develop own ideas and techniques.

Rates for women are slightly lower. Successful candidates, who are aged 18 and over, will be required to join the Authority's contributory superannuation scheme.

Housing will be available within a reasonable period for the selected officers if they are married and at present live outside the radius of the Establishment's transport facilities; and advances will be given towards the cost of removal where necessary.

Requests for Application Form on a POST CARD to the Establishment Officer, U.K. Atomic Energy Authority, A.E.R.E., Harwell, Didcot, Berks., quoting 2/103/392.

BRITISH INSULATED CALLENDER'S CABLES, LTD., require a Metallurgical Chemist to take control of Laboratory and technical control in Foundry producing ferrous and non-ferrous castings. Either a Graduate with a few years' practical Foundry experience or a man who has worked in a Foundry Laboratory and studied metallurgy at Technical School would be considered. Applications in writing should be addressed to the Staff Officer, B.I.C.C., Ltd., Prescott, Lancs., quoting reference P/9/55.

HIVAC, LTD., a Company associated with a major group in the telecommunications field, invites applications for vacancies which have arisen in connection with a new project in the Semi-conductor field from:

Physical Chemists/Metallurgists

The work will cover a wide range of problems concerned with methods of material preparation together with the development of appropriate techniques for measurement and process control, and will offer considerable scope for initiative and originality.

The Company's activities are expanding and the posts, which are pensionable, offer scope for advancement.

Applications, which will be treated in strict confidence, quoting reference "NM", and stating age, education, qualifications, and salary expected, should be addressed to the Engineer-in-Chief, Hivac, Ltd., Stonefield Way, Victoria Road, South Ruislip, Middlesex.

APPOINTMENTS VACANT

ATOMIC ENERGY RESEARCH ESTABLISHMENT, HARWELL, has vacancies in its METALLURGY DIVISION.

The main fields of work are:

(a) Problems related to the analysis of metals and alloys required in the research programme for the development of nuclear fuels.

The work is interesting and of a non-routine nature and offers scope for originality. Experience in modern analytical techniques is desirable.

(b) To investigate the effects of irradiation on the physical properties of metals, and to assist in the design, development, and use of new techniques for this work.

Possession of a degree in metallurgy or physics, or equivalent qualifications, would be an advantage. Posts offer plenty of scope for a person with an experimental flair and imaginative ideas.

(c) To be employed in the Ceramics and Powder Metallurgy Sections on investigations into the fabrication and properties of advanced fuel elements in connection with the atomic energy power programme. Experience in the use of powder techniques is desirable.

Appointments in the above fields will be made according to age,

MAGNESIUM ELEKTRON, LTD.

Magnesium Elektron, Ltd., require an experienced Development Engineer for their works near Manchester. Duties will involve the development of applications and of methods of production of wrought magnesium alloys for aircraft and other industries. Applicants should be between 25 and 35 and possess good engineering degree or equivalent. They should be energetic, of an adaptable nature, and have a strong personality with common sense and a practical outlook. Experience in the aircraft or motor industry would be an advantage. Salary would be according to qualifications and experience but not less than £900 per annum. Contributory pension scheme embodying life assurance. Apply, quoting IM.JL29, to Secretary, Magnesium Elektron, Ltd., P.O. Box No. 6, Lumm's Lane, Clifton Junction, Swinton, Manchester.

APPOINTMENTS VACANT

LABORATORY ASSISTANTS. A number of appointments are available in metallurgical laboratories of B.W.R.A. in London and Abington (nr. Cambridge). Applicants should have some general metallographic and testing experience in non-ferrous or ferrous materials. Experience of welding not essential; specialized training will be given where necessary. Appointments as Research Assistants within range £400-£600 p.a. Apply The Secretary, 29 Park Crescent, London, W.1.

METALLURGISTS FOR ATOMIC POWER PROGRAMME

Physical Metallurgists are required for senior appointments in a new research and development group. These positions require young men with good honours degree or Ph.D. qualifications. Applications for interview should be addressed to:

The Personnel Manager,
Fraser & Chalmers Engineering Works,
Erith,
Kent.

METALLURGISTS required for development work in connection with the production of copper and copper-base alloys. A degree or equivalent qualification with some industrial experience is necessary. The work is interesting and requires a high standard of initiative. Permanent position, staff pension scheme, accommodation available for married man after short period of satisfactory service. Salary according to qualifications and experience. Age should not exceed 30 years. Apply by letter, giving full details, to Labour Manager, Enfield Rolling Mills, Brimsdown, Enfield, Middx.

PHYSICAL METALLURGIST required for programme of laboratory investigational work on alloys in the Research Laboratory of Imperial Smelting Corporation, Ltd. A degree or equivalent qualification in Metallurgy is required, together with at least one year's experience of the practical application of physical-metallurgy work, preferably in a Research Department. Applications to Personnel Manager, Imperial Smelting Corporation, Ltd., Avonmouth, quoting reference AJE/IM.

QUALIFIED ENGINEER or **METALLURGIST** required for research work on fatigue and general properties of high-grade engineering materials in Research Laboratory situated in West London area. Excellent prospects for keen and enthusiastic young man above 25 years of age. Commencing salary of at least £800 per annum for a suitable applicant. Pension Scheme and five-day week. Apply to Box No. 396, The Institute of Metals, 4 Grosvenor Gardens, London, S.W.1, quoting reference 45/L.

THE BRITISH THOMSON-HOUSTON CO., LTD., invites applications from qualified metallurgists and physicists for research on metallurgical problems of atomic reactors. There are openings for University graduates with or without research experience and for men with Higher National Certificate. Experience or interest in the mechanical properties of metals and alloys would be an advantage. Apply, quoting reference OCG, and stating age, qualifications, and experience to the Director of Research, British Thomson-Houston Co., Ltd., Rugby.

THE MOND NICKEL CO., LTD.

invites applications from

METALLURGISTS, CHEMISTS, and PHYSICISTS

for various Senior and Junior posts in

THE RESEARCH LABORATORIES IN BIRMINGHAM AND LONDON

and

THE DEVELOPMENT DIVISION IN LONDON

The work is concerned with fundamental researches and short-term investigations covering Ferrous and Non-Ferrous Materials and the subsequent development and application of these in a wide variety of industries.

The present posts relate to:

- (a) Nickel-base alloys
- (b) Alloy Steels and Cast Irons
- (c) High-Temperature Materials
- (d) Special Chemical Products
- (e) Precious Metals

Apply, stating age, qualifications, experience, and salary required, to the Manager, Development and Research Department, The Mond Nickel Co., Ltd., Millbank, London, S.W.1. Mark envelope "Confidential O.I."

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG, SOUTH AFRICA

Applications are invited for appointment to a vacant post of **SENIOR LECTURER** in the University Department of Metallurgy and Assaying. The successful applicant will be expected to assume duty on 3 January 1956.

The substantive salary attached to the appointment will be on the scale £1100 × 50-£1450 per annum, plus a cost of living allowance of £234 per annum in the case of a married man.

The appointment is subject to two years' probation. Membership of the University Institutions' Provident Fund is compulsory and involves a contribution at the rate of 7% of the pensionable salary, which is based on the scale £1050 × 50-£1400, an equal amount being contributed by the Government and the University together. Membership of the Staff Medical Aid Fund is compulsory for those who are found eligible for such membership.

Applicants are advised to obtain a copy of the information sheet giving further details relating to this vacancy from the Secretary, Association of Universities of the British Commonwealth, 36 Gordon Square, London, W.C.1.

The closing date for the receipt of applications in South Africa and London, is 31 October 1955.